

A NEW SPECIES OF *TAUDACTYLUS* (MYOBATRACHIDAE) FROM
SOUTHEASTERN QUEENSLAND, AUSTRALIA

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ABSTRACT

Taudactylus pleione sp. nov. is described from Kroombit Tops, near Gladstone, southeastern Queensland. It is most closely related to the cryptic species *T. liemi* (from mideastern Queensland) and *T. rheophilus* (from northeastern Queensland).

INTRODUCTION

Myobatrachid frogs of the genus *Taudactylus* Straughan and Lee occur in association with upland and montane rainforests of eastern Queensland (Liem and Hosmer 1973, Ingram 1980). Two species (*T. rheophilus* and *T. acutirostris*) are found in northeastern Queensland and two (*T. eungellensis* and *T. liemi*) in mideastern Queensland. The remaining species, *T. diurnus*, is known from the Blackall, Conondale and D'Aguilar Ranges near Brisbane (Czechura 1975, 1984, Ingram 1980) in southeastern Queensland.

During the December 1983 Queensland Naturalists Club annual campout held at Kroombit Tops (24°27', 150°26'), near Gladstone, frog calls, resembling those of some species of *Taudactylus*, were heard in rainforest at the headwaters of Kroombit Creek. A single specimen of one of these frogs was later obtained. Subsequent visits to this area resulted in the collection of further specimens of this taxon along with information concerning its natural history. Examination of these specimens established that the Kroombit Tops frog represented a previously undescribed species of *Taudactylus*, which is the subject of the following contribution.

Measurements are in millimetres and ratios are expressed as percentages. Abbreviations follow Liem and Ingram (1977) and Ingram (1980). All specimens are held in the Queensland Museum (QM) herpetological collection.

Taudactylus pleione sp. nov.
(Figs 1, 4, Plate 1)

MATERIAL EXAMINED

HOLOTYPE: J42392, adult female, headwaters

Kroombit Creek, Kroombit Tops via Calliope (24°27', 150°26'), coll. G.B. Monteith, 6–10 February, 1984.

PARATYPES: J42137, same locality as holotype, coll. G.B. Monteith, 11 December, 1983; J42388–91, same data as holotype (J42390, cleared specimen); J42422–3, same locality as holotype, coll. G.V. Czechura and S. Wilson, 23 February 1984.

DIAGNOSIS

Distinguishable from *T. diurnus* and *T. eungellensis* by very small discs on fingers and toes; from *T. acutirostris* by the absence of dorsolateral skin folds and snout shape in profile (rounded vs wedge-shaped); from *T. rheophilus* by less robust build (HW/SVL 31–34 vs 37–42), absence of a continuous dark lateral band from the eye to groin and snout shape in profile (rounded vs vertical); from *T. liemi* by rounded rather than acuminate head shape when viewed from above, relatively deeper and blunter snout profile vs sloping, somewhat pointed profile of *T. liemi*, grey or bluish grey ground colouration vs grey-brown or light to dark brown dorsal ground colour, broad interorbital bar of more-or-less uniform width in *T. pleione* (not triangular-shaped and widest along midline) and darker, more intense ventral pigmentation vs cream ventral surface with variable amounts of light brown speckling. Ingram (1980) reports that some *T. liemi* may possess intense brown speckling ventrally, however comparison of these individuals with specimens of *T. pleione*, reveals that this speckling in *T. liemi* is much paler than even the palest ventral speckling of *T. pleione* specimens.

DESCRIPTION OF HOLOTYPE

SVL 28.5, TL 13.8, TL/SVL 53, HW 9.6,

HW/SVL 34, ED 3.3, ED/HW 34, EN 2.2, IN 3.3, EN/IN 67.

Dorsal aspect of head rounded; snout profile blunt, rounded and barely overlapping lower jaw. Loreal region sloping. Canthus rostral is distinct, rounded, curved between eye and naris, then smoothly converging anteriorly to form a rounded snout. Pupil horizontal, oval. Tympanum concealed. Tongue hinged in front, more or less oval in shape, but slightly wider posteriorly. Vomerine teeth absent. Fingers cylindrical not webbed, slightly expanded distally, length from shortest to longest 1-2-4-3. Large rounded tubercles at base of fingers; outer palmar tubercle rounded, slightly larger than oval inner palmar tubercle. Toes not webbed but distinctly fringed with slight distal expansion; length of toes from shortest to longest 1-2-5-3-4. Low rounded tubercles at base of toes with smaller tubercles distally on third, fourth and fifth toes; a small

oval inner metatarsal tubercle. Skin smooth. Cloacal opening directed posteriorly at midlevel of thighs.

Dorsal ground colour grey with small patches of darker grey, grey-brown and some yellowish suffusion latero-dorsally. A broad, curved black interorbital bar of more or less uniform width directed posteriorly. A blackish 'X'-shaped marking over shoulder region. Paired, irregular, elongated dark patches over inguinal region directed somewhat anteriorly towards midline. Two prominent crossbars and seven to eight prominent crossbars on front and hindlimbs respectively, paler less defined greyish crossbars may be placed between these. Fingers and toes barred with grey. Lateral surfaces greyish brown; a dark line from loreal region through eye and enclosing tympanum then curving downwards forward of hind limb. Side of face darker grey. Short dark bar above forelimb which may contact

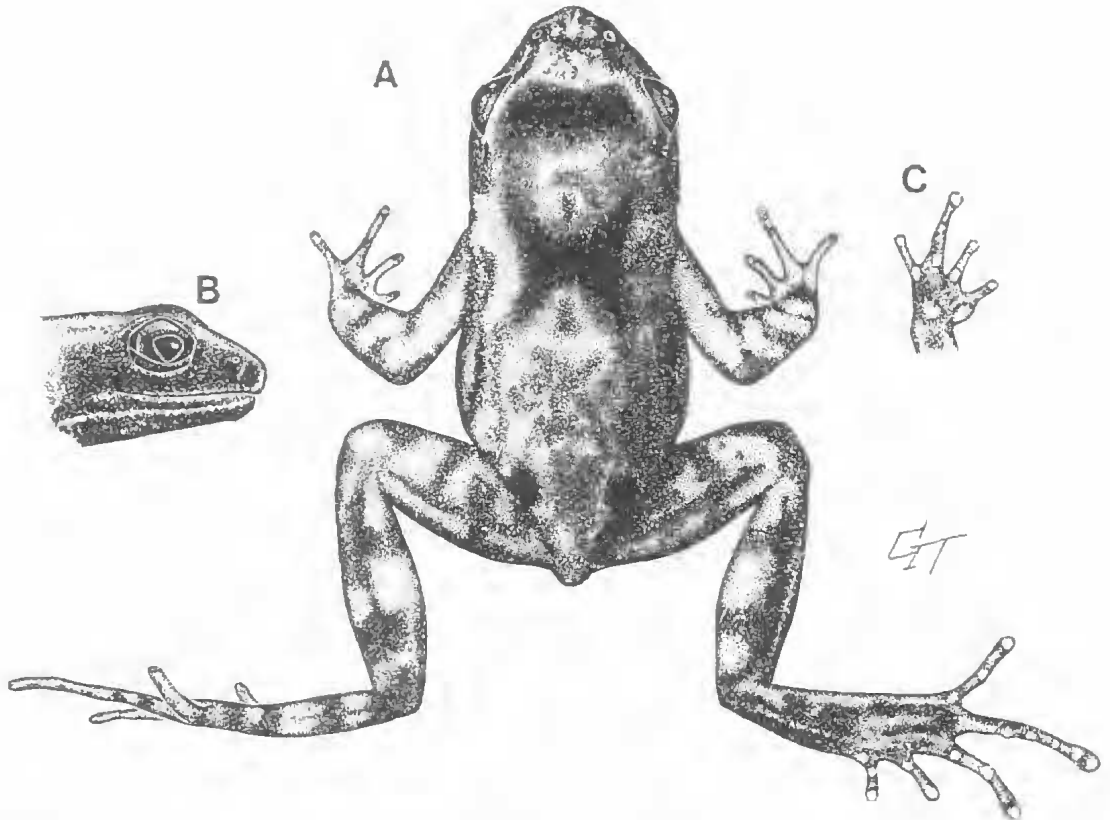


FIG. 1: *Taudactylus pleione*. A, Dorsal view including ventral aspect of hind foot; B, Lateral view of head; C, Ventral aspect of hand.

another dark bar which commences in the axillary region, this latter bar narrows posteriorly and continues dorsolaterally to the knee. Posterior surface of thighs dirty yellow, barred and speckled with brown. Ventral surface dirty cream extensively mottled and speckled with grey brown.

DESCRIPTION OF PARATYPES

SVL 24.8–26.4 (N 7, mean 25.9), TL 12.4–13.8 (N 7, mean 13.1), TL/SVL 49–53 (N 7, mean 51), HW 7.7–8.6 (N 7, mean 8.5), HW/SVL 31–34 (N 7, mean 33), ED 3.0–3.4 (N 7, mean 3.2), ED/HW 34–4 (N 7, mean 38), EN 1.8–2.1 (N 7, mean 1.9), IN 2.8–3.4 (N 7, mean 3.1), EN/IN 56–75 (N 7, mean 62).

Dorsal colouration greyish (or even somewhat bluish-grey) with markings similar to the holotype. The interorbital bar is prominent in all specimens, although it may be curved or straight and is of more or less uniform width. In darker specimens the shoulder markings may be less prominent than either the interorbital bar or inguinal blotches; the shape of the shoulder marking is variable, forming either two triangles (apices directed towards midline), an hourglass or 'X'-shaped marking but is never continuous with the interorbital bar. The inguinal markings also variable in size. Lateral markings similar to holotype, except that the short bar located above the forelimb may become enclosed by the posterior marking. The dark marking which passes through side of face to tympanum is never continuous with the posterior band commencing at the forelimb. All specimens with dense brown or greyish brown mottling and speckling on ventral surfaces, in some specimens there is evidence of pale medial stripe in the throat region.

Vocal sacs present in males. Nasal bones narrow, widely separated not contacting either maxillary or sphenethmoid; frontoparietal fontanelle moderately large with posterior expansion (Fig. 1A), zygomatic rami of squamosal longer than otic rami; omosternum present; sternum rounded; terminal phalanges T-shaped.

HABITAT

Rocky streams and their environs in montane rainforest or rainforest/wet sclerophyll forest transition. Usually found around or under rocks near permanent or semi-permanent pools and running water. Also may be encountered in leaf-litter nearby.

DISTRIBUTION

Known only from the headwaters of Kroombit Creek, Kroombit Tops, SE.Q. (Fig. 4).

FIELD NOTES

During periods of low activity, these frogs shelter deep within rock crevices, under large boulders or within rock piles in the vicinity of permanent pools or running water. Their presence at these times may only be indicated by occasional calls.

Activity seems to be initiated by the first heavy falls of rain during the spring-summer period. When active these frogs may also be found in leaf-litter or under stones along the watercourses where ephemeral pools and soaks form. Males call during the day and well into the evening and early night. Calling is most intense during early evening. The minimum distance between calling males is about 1.5 metres. There was little activity noted during the December 1983 visit to the area. Most activity seems to have occurred in early February (when the holotype, a gravid female was collected). By late February, activity seems to have declined, certainly no females were encountered although males were still calling. No basking or obvious diurnal behaviour was recorded. Synchronosympatric species, *Litoria barringtonensis*, *Adelotus brevis* and *Mixophyes fasciolatus*.

CALL

The following description is based on a recording made at Kroombit Tops on 23 February 1984. To the ear, the call consists of a series of rapidly repeated metallic 'tinks' which are given at regular intervals. Each series of 'tinks' may consist of 2–14 separate notes (usually 8–10). The interval between notes slows towards the end of a series, being most conspicuous when a large series of 'tinks' is given. Each series may last from 2–4 seconds and is repeated at intervals from 3–10 seconds. Captive specimens held in plastic bags have also been heard making a short 'click' resembling a call of *Pseudophryne major*.

ETYMOLOGY

Named for Pleione, mother of the Pleiades in Greek mythology. The star Pleione is thought to be the 'missing' bright star of the Pleiades cluster (Clark 1983).

COMMENTS

Discovery of *T. pleione* in the northern part of southeastern Queensland raised questions concerning the identity of a specimen assigned to *T. acutirostris* which was collected at Mundubbera (25°31', 151°18'). This specimen (British Museum [Natural History] 1938.7.2.1.) was first reported by Parker (1940). Although Liem and Hosmer (1973) did not examine this specimen, they report that an examination of the

specimen at the British Museum indicated 'that the specimen ties with *acutirostris* better than with the other three taxa recognized here' (Grandison in Liem and Hosmer 1973, p. 450).

Examination of this specimen was warranted in view of the proximity of Kroombit Tops to Mundubbera. BMNH 1938.7.2.1. is badly faded and in poor condition, however it is clearly not assignable to *T. pleione*. The Mundubbera *Taudactylus* is distinguishable by virtue of the following features; small toes discs, evidence of a dorsolateral skinfold, presence of dark ventral markings most prominent below the throat, presence of an apparently complete dark lateral band, no indication of a dark interorbital bar or triangle, blunt snout when viewed from above (shape in profile no longer discernable), dark pigment along posterior surface of thighs and a high EN/IN ratio (136 vs 62 in *T. pleione*). Consequently, the earlier decision (Liem and Hosmer 1973) to assign this specimen to *T. acutirostris* is upheld.

T. acutirostris is presently only known to occur in northeastern Queensland between Mt Hartley and Tully Falls (Ingram 1980). This species has not been collected in the rainforests between Tully Falls and Mundubbera (e.g. Cardwell Range — Mt Spec, Mt Elliot, Clarke Range — Eungella, Conway Range). Apart from BMNH 1938.7.2.1. there have been no other collection of *T. acutirostris* from southern Queensland. Attempts by Liem and Hosmer to obtain specimens of *Taudactylus* in the Mundubbera area proved unsuccessful (Liem and Hosmer 1973) as have all subsequent investigations.

All species of *Taudactylus* are found in association with watercourses in upland (above 300 m a.s.l.) rainforest (Liem and Hosmer 1973, Ingram 1980, herein). In contrast, the Mundubbera area supports little rainforest vegetation, apart from some patches of dry

'vinescrub', and is of low relief, most of the area is less than 200 m a.s.l. The absence of further collections of *T. acutirostris* from Mundubbera and the unsuitability of habitat here indicate that the provenance of BMNH 1938.7.2.1. is in error.

RELATIONSHIPS

Ingram (1980) recognized two sister groups within the genus *Taudactylus* — the *T. diurnus* complex (*T. diurnus* and *T. eungellensis*) and the *T. acutirostris* complex (*T. acutirostris*, *T. rheophilus*, *T. liemi*). Comparison of *T. pleione* with its congeners using the character states employed by Ingram (*op. cit.*) clearly establishes *T. pleione* as a member of the *T. acutirostris* complex. Recognition of *T. pleione* as a member of this species complex necessitates a reappraisal of intra-group relationships.

In terms of behaviour, the most aberrant member of the *T. acutirostris* complex is *T. acutirostris* itself. This species, in common with members of the *T. diurnus* complex, engages in conspicuous diurnal and basking activity. In contrast *T. rheophilus*, *T. liemi* and *T. pleione* are all cryptic and rather crepuscular in their activity. *T. acutirostris* also differs from the other three species in external morphology (wedge-shaped snout in profile, rather narrow snout and presence of dorsolateral skin folds) and osteology, particularly of the skull and pectoral girdle (Table 1). Furthermore, *T. acutirostris* is unique amongst *Taudactylus* spp. in its possession of an elongate sternum (Fig. 2D), presence of coxycal tubercles and dorsolateral skinfolds. In contrast, differences in behaviour and skeletal features between *T. rheophilus*, *T. liemi* and *T. pleione* are slight. Comparative data on the skeletons were obtained from Lynch (1971), Liem and Hosmer (1973), Ingram (1980) and inspection of cleared specimens of *T. liemi* (QM J32618) and *T. pleione* (QM J42390).

TABLE 1: COMPARISON OF SKELETAL FEATURES WITHIN THE *TAUDACTYLUS ACUTIROSTRIS* COMPLEX (SENSU INGRAM 1980).

Character	<i>rheophilus-liemi-pleione</i>	<i>acutirostris</i>
frontoparietal fontanelle	distinct posterior expansion (Fig. 2A)	posterior expansion weak or absent (Fig. 2B)
condition of sternum	rounded (Fig. 2C)	elongate (Fig. 2D)
condition of squamosal a. zygomatic ramus	posterior broadly expanded (Fig. 2E)	posterior narrowly expanded (Fig. 2F)
b. anterior process of otic ramus	long, pointed (Fig. 2E)	short, pointed (Fig. 2F)

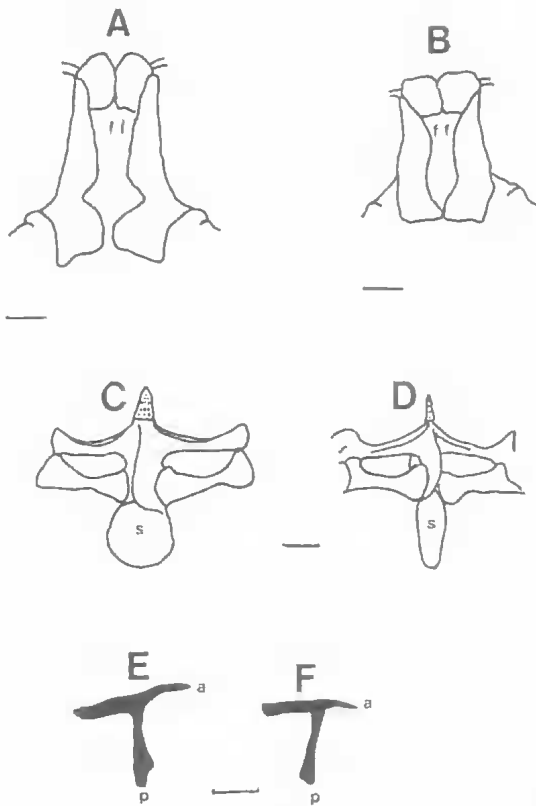


FIG. 2: Selected skeletal features of *Taudactylus* spp. A-B, dorsal view of frontal region of skull. C-D, pectoral girdle. E-F, squamosal. (Scale equals one millimetre : abbreviations; ff — frontoparietal fontanelle, s — sternum, a — anterior process of otic ramus, p — posterior of zygomatic ramus). See text for explanation.

In view of these differences, it is suggested that two complexes should be recognized to accommodate the four species. The first complex, the *T. acutirostris* complex, is composed of only *T. acutirostris* while the second, the *T. rheophilus* complex, is composed of the three cryptic species (*T. rheophilus*, *T. liemi* and *T. pleione*). The intra-generic relationships of *Taudactylus* spp. are shown in Fig. 3. The greater closure of the frontoparietal fontanelle, elongate sternum, coccygeal tubercles, dorsolateral skinfolds and diurnal behaviour of the *T. acutirostris* complex indicate that it is the more specialised of the two new complexes recognized here. The status of the *T. diurnus* complex remains unchanged.

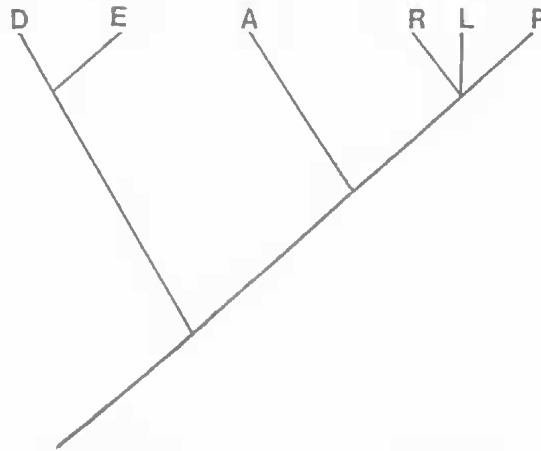


FIG. 3: Relationships of the species of *Taudactylus*. (D — *T. diurnus*, E — *T. eugellensis*, A — *T. acutirostris*, R — *T. rheophilus*, L — *T. liemi*, P — *T. pleione*).

BIOGEOGRAPHY

The biogeographical and evolutionary patterns within *Taudactylus* have been interpreted using an allopatric model of speciation (Ingram 1980). This model was based on alternate expansions and contractions of rainforest in eastern Queensland. The current study supports this scenario with slight modification. The ancestral *Taudactylus* stock is assumed to have been similar to members of the extant *T. rheophilus* complex. Cryptic habits and crepuscular (or even nocturnal) activity were presumably shared by both the *T. rheophilus* complex and the ancestral stock. The activity pattern of the ancestral stock probably bore some resemblance to those exhibited by extant small, cryptic microhylid and myobatrachid frogs.

Contractions of rainforest presumably produced five isolates of the ancestral *Taudactylus* stock. Three of these isolates Mt Lewis — Thornton Peak — Mt Bellenden Ker, Eungella Plateau, Kroombit Tops) retained crepuscular activity and cryptic habits and remained restricted to these montane refugia (*T. rheophilus* complex). It seems that members of the *T. rheophilus* complex have been unable to take advantage of subsequent rainforest expansions to successfully establish themselves widely.

The remaining isolates (southern southeastern Queensland and southern Atherton Tableland) independently evolved diurnal activity and behaviour (ancestral *T. diurnus* complex stock

and *T. acutirostris* stock). Subsequent rainforest expansions led both groups to expand their ranges. In the south, further rainforest contractions led to the isolation and differentiation of *T. diurnus* (Blackall — Conondale — D'Aguiar Ranges) and *T. eungellensis* (Eungella Plateau — Clarke Range). In northeastern Queensland expansions of rainforest led to a northward dispersal of *T. acutirostris* into the area occupied by *T. rheophilus*. Later rainforest contractions in northeastern Queensland have been insufficient to produce further differentiation within the *T. acutirostris* complex (See Fig. 4).

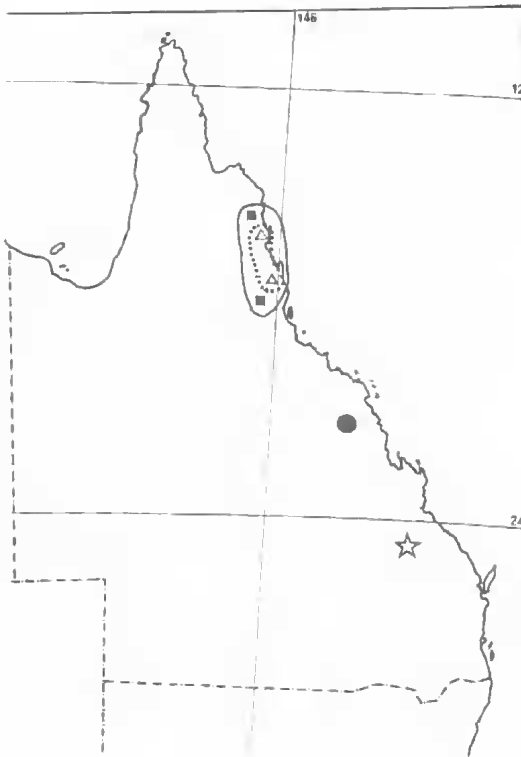


FIG. 4: Distribution of members of the *Taudactylus rheophilus* species group (triangles - *T. rheophilus*, closed circle - *T. liemi*, star - *T. pleione*) and *Taudactylus acutirostris* species group (closed squares - *T. acutirostris*). The northern and southern limits are used to define the boundaries of the *T. rheophilus* and *T. acutirostris* distributions of NE. Queensland.

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PLATE 1

Taudactylus pleione sp. nov. in life. Holotype QM J42392
headwaters of Kroombit Creek, Kroombit Tops via Calliope,
SE.Q.

